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# EXCAVATIONS AT KIS-008, BULDIR ISLAND: EVALUATION AND POTENTIAL

DEBRA G. CORBETT, CHRISTINE LEFÈVRE, THOMAS J. CORBETT,  
DIXIE WEST, AND DOUGLAS SIEGEL-CAUSEY

*Abstract.* In 1991 a multidisciplinary team initiated excavations at the only known midden site on Buldir Island in the western Aleutians. The project integrated archaeological and biological research to understand human adaptations and Holocene environments over time. Buldir was chosen for the project for several reasons: (1) it is strategically located between the Rat and Near Islands and potentially contributes information on rate of westward migration of hunters in the Aleutian chain, (2) it can provide clues to the amount and kind of communication and/or isolation that existed among the western islands, and (3) its extant faunal population was never impacted by foxes and should be an excellent analogue for the island's past biodiversity. Radiocarbon dates suggest the island was inhabited as early as 1100 years ago. This paper describes the bone, lithic, and wooden artifacts recovered from two test pits excavated on the beachfront of the midden site. Due to the unusual preservation in the island midden, fragile organics, including wood, were recovered. For the first time, western Aleut woodworking technology is discussed. Additionally, this paper explores the types and sources of lithic raw materials selected by ancient peoples on Buldir. Lithic and bone artifact analysis, coupled with radiocarbon dates, suggest that both Rat and Near Islanders used Buldir—sometimes concurrently. The first year's excavation on Buldir shows the potential for prehistoric research in the western Aleutian Islands.

## Introduction

In 1991, an interdisciplinary team of archaeologists, biologists, and geologists began a multiyear research project in the western Aleutians. Biological considerations led us to select Buldir Island as the focus of the first phase of the project. The first season's work at the small midden on Buldir Is-

land emphasized reconnaissance to determine the potential of the site to address biological and archaeological research questions.

The archaeology of the western Aleutians is poorly known. Although Dall (1877), Jochelson (1925), and Hrdlička (1945) all excavated in the Near Islands, the only fully published excavation is that of Spaulding (1962) for Agattu Island.

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Hrdlička, Spaulding, and also McCartney (1971) have documented that Near Island artifact assemblages are noticeably different from those farther east in the Aleutians. Black (1984) proposed that Near Island culture was ethnographically distinct and postulated contact with Asia to explain the differences.

The Rat Islands, to the east of Buldir, are better known due to salvage excavations related to testing of nuclear weapons on Amchitka in the 1960s (Desautels et al. 1971; Cook et al. 1972). Reports on these excavations are primarily descriptive. Since the mid-1970s, archaeologists have increasingly used an ecological framework to interpret Aleutian prehistory (McCartney 1975, 1977; Laughlin and Aigner 1975; Yesner and Aigner 1976; Yesner 1980).

With at least 104 km separating the island from its nearest neighbors, Buldir does not belong to either the Rat or Near Island groups. Buldir was a "stepping stone" for the first people moving into the western Aleutians, probably over 3000 years ago (Corbett 1990). Historically both the Rat and Near Islanders claimed Buldir and apparently used the island concurrently (Black 1984). Due to its isolation, topography, and small size, it is unlikely that the island could support a permanent resident population. Instead, it was probably a sporadically occupied camp or station for people exploiting resources or traveling between the island groups.

We approached Buldir with very general research questions. Establishing a site chronology and evaluating the site's research potential were the primary goals. In addition to refining our knowledge of the culture history of the islands, we are studying economic strategies to understand how Aleuts adapted to the local environment. Paleobiological research focused on changes in the relative numbers and species of seabirds to document subtle changes in the marine environment. This research is addressed in a companion paper by Lefèvre and others (1997). We specifically sought to learn: (1) why Aleuts used such a remote landfall, (2) how regularly the island was used, annually or intermittently, and (3) whether the occupations were seasonal.

We are also interested in questions of contact between hunter/gatherers who inhabited the Rat and Near islands. As the only landfall between the two groups, was the island disputed territory, shared, or firmly controlled by one group? And, did this change through time? The isolation of the island makes it a unique laboratory for addressing these questions.

## Setting

Buldir is a 20.2 km<sup>2</sup> island lying 117 km west of Kiska and 104 km east of Shemya Island in the

western Aleutians (Fig. 1). Its position near the center of the widest inter-island pass in the Aleutian Islands makes it the most isolated island in the chain. Buldir is steep and rugged, with three peaks over 540 m. Buldir Eccentric, the tallest, reaches 655 m. There are no harbors or bays to shelter ships or provide safe landings in foul weather. The coastline is ringed with small boulder beaches backed by steep cliffs. The only flat area suitable for human occupation is a small valley on the northwestern shore (Fig. 2), where the midden site is located.

The ruggedness and size of Buldir influenced the resources available to Aleuts. The shoreline drops off rapidly to deep waters, restricting in-shore fish resources; shallow coastal waters cover only about 32 km<sup>2</sup> (McCartney 1977:67). Likewise, the lack of extensive reefs means few shellfish are available as emergency food. In the 1960s, the island supported a sea lion colony of 3450 animals (McCartney 1977:87). The most abundant island resources are enormous populations of colony nesting seabirds. Over 4 million birds occupy the island between April and October (Byrd and Day 1986). The most abundant are petrels (1.5 million), but auklets (85,000), puffins (20,000), murrelets (13,000), and kittiwakes (13,000) are also common (Sowls et al. 1978). In addition, 6000 Aleutian Canada Geese nest on Buldir (Vernon Byrd, personal communication, 1991). Today, this abundance makes Buldir unique, but before wholesale fox introductions in the early twentieth century, many islands had similarly large bird colonies.

The only known midden site on Buldir extends for 180 m along the beach fronting the northern valley. Small streams define the west and east edges of the site. The mound, 30–40 m wide, merges gradually into a marsh to the south (Fig. 3). Beach rye grass (*Elymus arenarius*) and umbelliferous plants dominate the surface. Portions of the midden face on the beach are eroding up to 20 cm a year, mainly at the western end (Siegel-Causey et al. 1993).

The small site, with eroding shell midden, was first reported by Refuge Manager Robert Jones (1962). A brief 1972 survey failed to relocate the site (McCartney 1972). In 1975 Refuge Manager Vernon Byrd reported a possible Russian artifact, probably of copper, found near a human skull (Frohlich and Kopjansky 1975). The Aleut Corporation claimed the site under Section 14(h)1 of the Alaska Native Claims Settlement Act, and, in 1989, archaeologists from the Bureau of Indian Affairs (BIA) investigated the claim. They described a site on both sides of the westernmost stream, extending 360 m along the beach and up to 45 m wide. BIA archaeologists described numerous artifacts, including a stone lamp, projectile points, worked ivory and bone, and a figurine. One point

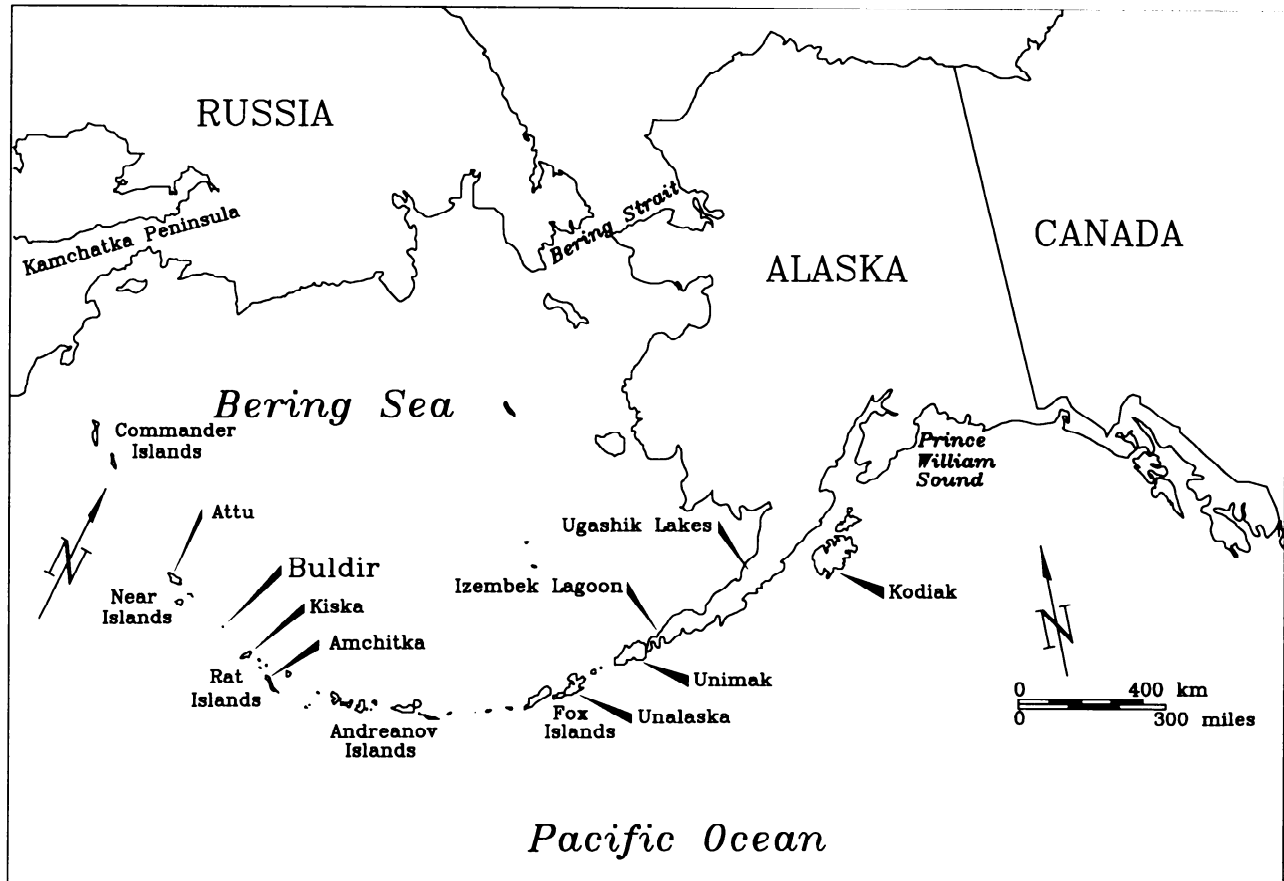


Figure 1. Map of the Aleutian chain.

was made of argillite, similar to material from Agattu Island (BIA ANCSA 1992).

## The Excavations

The entire beach edge of the site is eroding, as are portions of the site along the western stream. We cleared 11 profiles along the beach face. Rocks, whale bones, and wood, stone, and bone artifacts appeared in all the profiles. After examining the profiles, two were selected for small test excavations (Fig. 4).

The profiles were irregularly spaced in areas of lightest vegetation cover and steepest slope, about 20 m apart. All profiles contained alternating bands of sterile sand and darker, organic-rich cultural layers. The thickness of the cultural layers decreased from west to east. In the first six profiles, designated Test Pit 1 and Profiles A–E, sterile beach sand was found just under the surface vegetation mat. Two of the profiles, B and C, showed small pit features and A showed a larger, shallower depression that may be a house pit. In Test Pit 2 and Profiles F and G, a light brown, sandy cultural level was apparent under the vegetation mat.

## Pit 1

Pit 1, on the western edge of the midden profile series, consisted of a single 60 cm thick cultural deposit underlying 80 cm of sterile sand. The black, water-saturated soil held a dense mass of bone and wood. Grass, hair, egg shells, and egg membranes were also preserved in this unit.

The cultural deposit was excavated in arbitrary 10 cm levels. The first two levels were dry screened in 0.6 cm mesh screens. The nature of the soil matrix made this operation tedious and inexact, and we could not be sure we collected everything. The rest of the levels were water screened in nested 0.6 and 0.3 cm mesh screens. This cut screening time to a fraction of that required for dry screening and allowed more thorough collecting. Obvious artifacts were bagged individually. Bone, stone, and wood and other fragile organics were separated and bagged.

Pits 3 and 5, excavated in 1993, extensively tested the deposit described for Pit 1. Preliminary information on dates and lithic artifacts from these pits is included in this paper, but they are not completely described here because analysis is not complete.



## Pit 2

Pit 2, 143 m east of Pit 1, exposed alternating sandy and organic layers. The unit was excavated in natural levels. Levels 2, 4, 6, and 8 were sand, but contained some artifacts, probably intrusive from adjacent occupation surfaces. Level 6 contained a single large whale bone. The character of each organic layer was very different. Level 1 was a sandy soil with some dark organic material. This level may represent the historic period although no historic artifacts have been recovered. Level 3, an organic-rich layer with a thick grassy vegetation mat, was full of small bird bones. Level 5 was sandy with an extremely high density of bird bones. Level 7, dense and wet, contained wood and abundant bird and fish bones.

## Dating the Site

Few absolute dates are available for the Rat and Near Islands. Spaulding (1962:12–13) reported three radiocarbon dates from the Krugloi Point site on Agattu and suggested that the oldest date, 2630±300 BP, represented the oldest occupation of the site. Desautels et al. (1971:384) reported six dates from two midden sites on Amchitka ranging from 2550±95 to 890±90 BP. Table 1 presents previously unpublished dates from 1985 Bureau of Indian Affairs (BIA ANCSA 1992) tests of four “blowout sites” on Amchitka, our two seasons on Buldir, and from four sites on Shemya (Corbett 1990; Siegel-Causey et al. 1995).

Two wood samples from each pit excavated on Buldir, including Pits 3 and 5, excavated in 1993, were dated. Although using driftwood may supply dates that are older than the actual occupation of the site, these are believed to be accurate as no historical material (dating after 1741) was found in any unit.

Refits of broken sea lion bones suggest all six levels in Pit 1 are a single cultural unit (Christine Lefèvre, personal communication, 1992). Pits 3 and 5 are extensions of Pit 1 towards the center of the site. The six dates on this level range in age from 240±60 BP to 530±60 BP (uncorrected). This represents an occupation just preceding the advent of Russian fur traders and explorers. The thickness of the level suggests that the occupation was relatively intense and long-lasting, as compared with the rest of the cultural levels recorded.

In Pit 2, Levels 3 and 7 were dated. Level 3, the first clearly cultural level, was rich in organic materials and bird bones. The date suggests an occupation just prior to that in Pit 1. Level 7 is the deepest and earliest cultural level found on the site.

The dates from Shemya Island suggest that Level 7 does not represent the initial use of Buldir. We expected that the oldest Buldir dates would at least match those from the Near Islands, as early

colonists would almost certainly have made land-fall on the island. Several options may explain our failure to locate older deposits: (1) they have eroded away, (2) they are in another area of the site, or (3) earlier occupations were so ephemeral as to leave little trace.

## Excavation and Identification of Wood

Well-preserved wood was found in all cultural levels of both pits and in many of the profiles. Pit 1 contained large quantities of wood and may have been a woodworking area. The wood had been subject to some decay, and seemed primarily to be partially worked log fragments and large quantities of chipping or whittling debris. Wood was less abundant in Pit 2 and the other profiles and appears more deteriorated than that found in Pit 1.

Wood posed an excavation problem that we had not anticipated. Removing the fragile pieces from the sticky clay matrix with trowels resulted in breaking or slicing many of the pieces. Water screening proved less injurious, but some of the more decomposed pieces simply disintegrated in the process. Wood was washed in the screens and bagged separately from other materials. It was kept cool and wet in the field; the local climate definitely aided in this respect. After returning to Anchorage, the wood was washed again in fresh water, and the artifacts separated from working debris and unworked wood. Artifacts were soaked in a polyethylene glycol (PEG) solution for a week and then slowly air dried. Samples of unworked wood were selected for identification, while the remainder was air dried for radiocarbon dating.

The wood samples for identification were kept wet; drying destroys the cell structure used to identify species. To avoid drying and to prevent mold growth, the samples were frozen. Pieces to be identified had to be 10–12 cm long and 7–8 cm in diameter, and knots could not be used. Ten wood samples of suitable size, representing several obvious types of wood, were submitted to the U.S. Department of Agriculture Wood Products Laboratory in Madison, Wisconsin. The lab reported that half of the samples were of willow (*Salix*), while three were of spruce (*Picea*) and two of cottonwood or aspen (*Populus*). All of the species reported are presumed Alaskan in origin.

## Wooden Artifacts

Few wooden objects are found in most archaeological sites and those are usually in poor condition. Notable exceptions are the remains in burial caves found throughout the Aleutian chain. Hrdlička (1945) provided a list of wooden artifacts taken from caves on Unalaska, Kagamil, Shiprock, Atka, and Amlia, along with a few items from middens

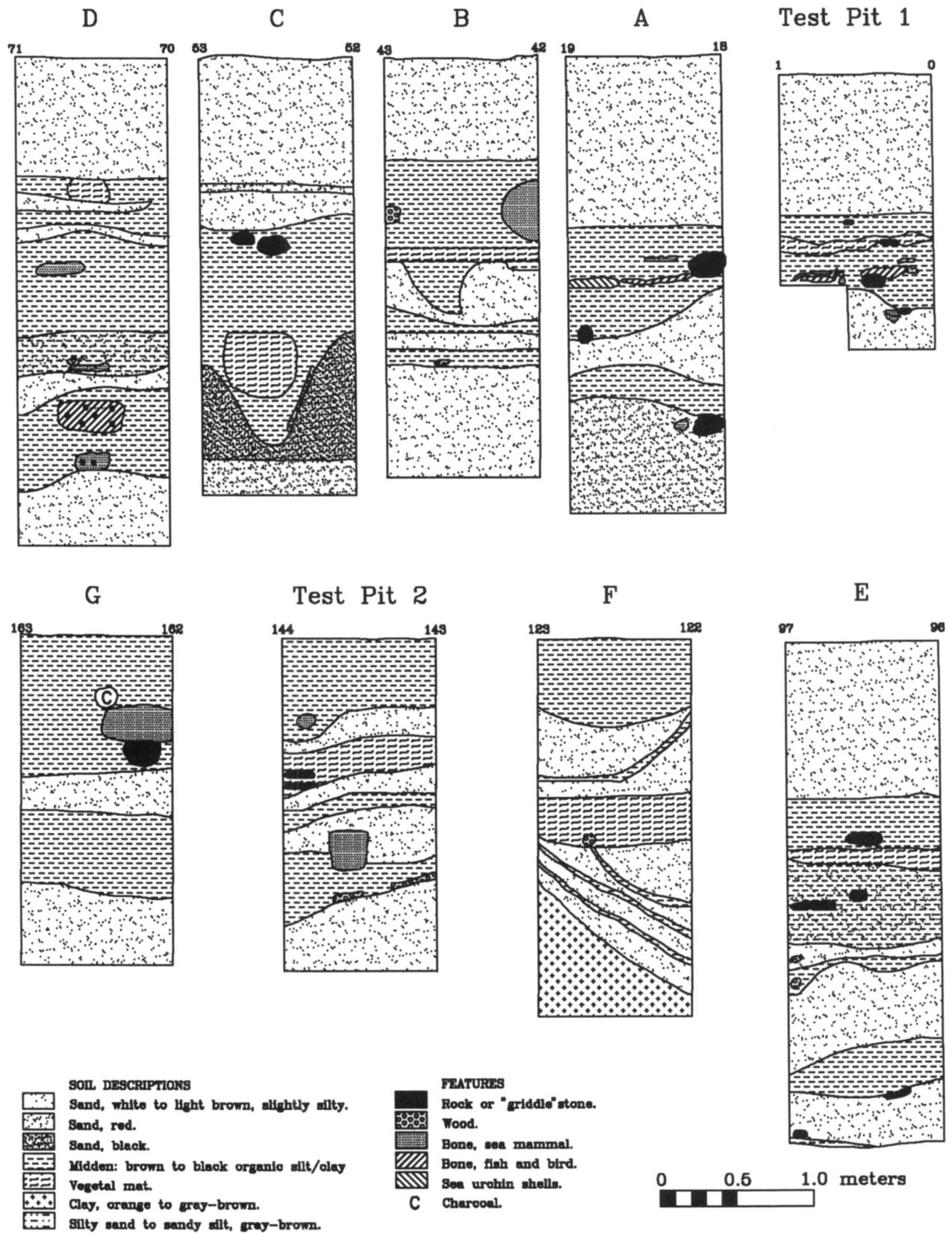


Figure 4. Buldir midden profiles along bluff, looking south.



**Table 1.** Western Aleutian radiocarbon dates.

Island	Site	Pit/Level	Material	C-14 Date BP	Lab No.
Buldir <sup>1</sup>	KIS-008	1/1	wood	460±50	Beta-54253
Buldir	KIS-008	1/6	wood	280±50	Beta-54254
Buldir	KIS-008	2/3	wood	530±60	Beta-54255
Buldir	KIS-008	2/7	wood	1160±50	Beta-54256
Buldir <sup>2</sup>	KIS-008	3/4 cut 2	wood	530±60	
Buldir	KIS-008	3/4 cut 8	wood	240±60	
Buldir	KIS-008	5/2 cut 1	wood	350±80	Beta-71566
Buldir	KIS-008	5/2	wood	320±60	Beta-71567
Amchitka <sup>3</sup>	RAT-017	blowout	charcoal	2430±190	Beta-29408
Amchitka	RAT-017	blowout	charcoal	3640±90	Beta-14933
Amchitka	RAT-024	blowout	charcoal	4440±90	Beta-15710
Amchitka	RAT-024	blowout	charcoal	3520±130	Beta-15711
Amchitka	RAT-068	blowout	charcoal	4610±110	Beta-14936
Amchitka	RAT-068	blowout	charcoal	4510±230	Beta-15712
Amchitka	RAT-070	blowout	charcoal	4330±100	Beta-14933
Amchitka	RAT-070	blowout	charcoal	4780±270	Beta-29407
Shemya <sup>4</sup>	ATU-003	1/4	charcoal	1790±160	Beta-39090
Shemya	ATU-003	1/6	charcoal	1860±90	Beta-39091
Shemya	ATU-003	2/1	charcoal	1770±120	Beta-39092
Shemya	ATU-003	3/1	charcoal	1720±70	Beta-40420
Shemya	ATU-003	3/3	charcoal	2030±70	Beta-40421
Shemya	ATU-003	3/3	charcoal	1810±60	Beta-40422
Shemya <sup>5</sup>	ATU-003	4/2	bone	2148±70	IEMAE-1172
Shemya	ATU-003	4/7	bone	2555±126	IEMAE-1177
Shemya	ATU-061	TP1/bottom	bone	3540±60	Beta-39104
Shemya	ATU-061	1/110–120cm	bone	3096±155	IEMAE-1175
Shemya	ATU-062	1/bottom	bone	2060±90	Beta-40424
Shemya	ATU-066	TP/1	bone	2244±182	IEMAE-1176

<sup>1</sup> The first four dates for Buldir are reported in Siegel-Causey et al. 1991.

<sup>2</sup> The last four dates for Buldir are reported in Siegel-Causey et al. 1993.

<sup>3</sup> All the dates for Amchitka are reported in BIA ANCSA n.d.

<sup>4</sup> The Beta dates for Shemya are reported in Corbett 1990.

<sup>5</sup> The IEMAE dates for Shemya are reported in Siegel-Causey et al. 1995.

on Little Kiska, Unalaska, and Amlia. The list includes spindles, vessels, diggers, armor rods, shields, combs, clubs, boat parts and paddles, a helmet, spoons, drum handles, wedges, and some projectile points. Rolls of birchbark, hollow tubes, carved slabs, a perforated disk, a cylinder with holes, and splits were also collected. Weyer (1929) briefly describes wooden weapon parts found in a burial on Unalaska Island. Early explorers described and illustrated household utensils and hunting equipment, indicating a highly developed and elaborate wood technology.

The collection from Buldir contains few whole pieces and represents a limited range of items. Six classes of objects were distinguished: points, shafts, slats, tapering cylinders, wood chips, and miscellaneous worked wood. Only two

items were decorated: a square rod with perpendicular grooves and a point with shallow incisions irregularly spaced and patterned around the shaft.

Of six possible points, only two share a similar morphology. These are short, blunt-tipped, tadpole-shaped pieces with rounded rectangular cross sections and slender tails that are roughly as long as the bodies (Fig. 5b,c). Two additional complete wooden points were recovered. One is cylindrical with a blunt tip and tapering base (Fig. 5e). The second is roughly shaped with a rectangular cross section and a flaring base that tapers sharply to a dull point. The tip may have been socketed to hold a stone or bone point (Fig. 5f).

The final two points are a base fragment and an unbarbed tip section (Fig. 5a,d; Fig. 6c). The base is a crudely worked shaft with a step-bev-

elled end. The bulb at the end of the base is charred. The tip is a tapering cylinder of a light wood with a slightly charred tip.

At least four of the points were designed to be set into a socket at the end of a weapon shaft and were probably detachable. The step-beveled foreshaft was probably attached more permanently to a shaft or foreshaft. Except for one, which may have held a stone blade, all the points are too blunt to be killing tips. They may have supported socketed bone points if they were not blunts.

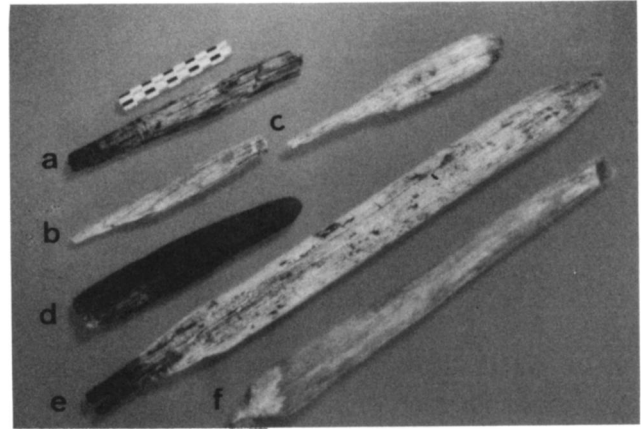
Two cylindrical, tapering objects with charred and rounded ends were recovered (Fig. 6a,b). One of the pieces has a neat round hole, 2 mm in diameter, drilled through the wide end; the other is undrilled. Functions for these objects are unknown, but they may be part of a fire drill.

The majority of the wooden artifacts are either slats or shafts. Ten slats are strips of wood, plano-convex in cross section. They range from 2.6–19.7 cm in length and are 2.5–0.7 cm thick (Fig. 7a). All are broken, making a functional interpretation impossible. A similar piece, a surface find, is complete. It is 22 cm long, 2 cm wide, and 0.9 cm thick with tabs on both ends. The piece is broken in the middle as if bent too far in use. It is similar in size and shape to ivory drill bows illustrated by Nelson (1899:84–85).

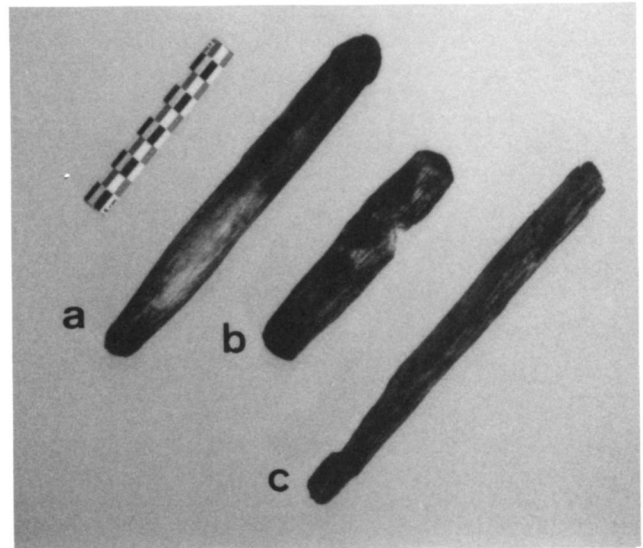
The 23 shaft fragments are remarkably homogeneous. They are round or oval sticks ranging from 3 to 8 mm in diameter. All appear to be broken; the longest is 15.9 cm long, the shortest 1.6 cm long (Fig. 7b). These thin shafts were cut from larger pieces of wood. Some of the shafts show undulations from stone tools and charring indicative of smoothing. Lateral cuts, perpendicular to the long axis of the shaft, suggest rougher shaping and waste wood removal. The ends of a few have been conically bevelled, then snapped to length.

Most of the remaining pieces are miscellaneous cut and roughly shaped with no clues to final form or function. One long slender piece was cut and squared to a rectangular cross section. It was cut perpendicular to the long axis by irregularly spaced wide shallow grooves. A few rounded battered pieces may be crude wooden wedges. All the pieces show cutting and chopping marks as well as charring; these modifications provide clues to the methods used in woodworking. A sample of 35 wood chips represent woodworking debris, the debitage left after shaping wood with adzes.

The limited range of types and lack of comparative material make the wooden artifacts of limited use in determining whether Rat or Near islanders used Buldir. The wooden points show some similarities to unbarbed bone point types, particularly the step-bevelled base of one (Desautels et al. 1971:199, fig. 94a–e; McCartney 1967:



**Figure 5.** Wooden points: (a) step-bevelled base; (b,c) tadpole-shaped points; (d) blunt; (e) tapered base; (f) flaring base.



**Figure 6.** Wooden artifacts: (a,b) fire drill shafts? (c) step-bevelled point base.

272, plate 101), but these are common types and of limited comparative value.

Little is known about Aleut woodworking techniques and products. The wooden artifacts and debris recovered from Buldir provide valuable information on prehistoric Aleut woodworking technology, resource use, and site function. Although the sample is small, the variety of cut marks, burn scars, and unfinished pieces promises great potential in providing information on this virtually unknown aspect of Aleut technology.

This preliminary analysis suggests woodworking and boneworking techniques were remarkably similar. The analysis of wood types has shown the range of woods available to and used by the Aleuts. Finally, finding a large area dominated by woodworking debris (Pit 1 and profiles A–D)

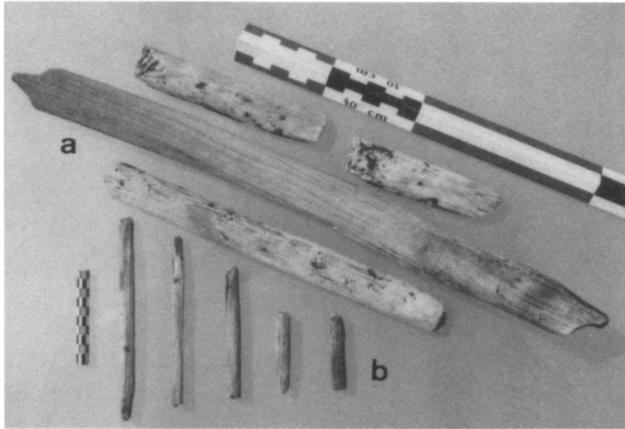


Figure 7. Wooden artifacts: (a) slats; (b) shafts.

may allow investigation of specialized use areas within a settlement.

## Lithic Analysis

### Material Types

Published geological information for the Aleutians is general and sometimes cursory. Two reports about Buldir describe only the northern coast of the island (Coats 1953, 1956); the interior and southern coast have never been described. To provide a more accurate and specific picture of local resources, 13 hand samples of rock from outcrops near the site were collected. By analyzing material types, we hoped to identify lithic material sources. Exotic materials, from islands other than Buldir, may indicate migration routes, exchange networks, and home territories of the island's populations.

The geologic samples represent seven classes of material with 1–3 types in each. All hand samples are volcanic and derive from one of several vents on Buldir. Most of the materials have been altered in several ways. The basalts, andesites, and dacite have been physically and chemically weathered; some of the constituent minerals have been replaced by iron oxides. The monzonites and diorite are hydrothermally altered, a process whereby heated groundwater changes the rock-forming minerals to clays. Most are not particularly suited for tool manufacture.

A total of 1824 flakes were recovered from the test pits and identified. Twenty-eight material types, based on minute differences in color, texture, and mineral content, were differentiated. These were later lumped into 16 types. Most of these fall into three broader classes: andesite and basalt (eight types), siliceous phyllite (two types), and phyllite (two types). Four miscellaneous classes are gabbro, red chert or jasper, white quartz, and basaltic ash.

Andesites and basalts are fine-grained volcanics that are widely available throughout the Aleutians. These materials were likely collected from the beach fronting the site. Artifacts made of these materials include sinkers, griddle stones, and hammers but no chipped stone tools. A total of 246 flakes of andesite and basalt, or 13% of the total flake assemblage, were collected (Table 2). Type A, porphyritic andesite, comprised 45% of the class with 110 flakes. Type D, an andesitic basalt, with 62 flakes made up 25% of the class.

Phyllite is a low-temperature, metamorphic rock with a less perfect cleavage than slate. Siliceous phyllite has been impregnated with silica resulting in better flaking and tool-making qualities. Phyllite and siliceous phyllite are found in large outcrops along the south coast of Buldir. Two color variants, gray and green, were identified for each material. The colors, as well as the degree of silicification, are gradational among the types.

Phyllite and siliceous phyllite make up 85% of all flaking debris (Table 3). Gray and green phyllites comprise 51% of the total assemblage, with the gray variant constituting 67% of the class and 34% of all flaking debris. The two siliceous phyllites make up 35% of all chipping debris, and the green variant is dominant at 20% of the total assemblage.

The miscellaneous classes include gabbro, basaltic ash, white quartz, and jasper (Table 4). Gabbro, the coarse-grained equivalent of basalt, is widely available in volcanic zones. Basaltic ash, a crumbly reddish rock, is silicified volcanic ash. Quartz and jasper occur as low-temperature deposits filling cracks and fissures in silica-rich rocks. None of these materials was common in the site; altogether, they comprise less than 1% of the assemblage.

As expected, most of the materials recovered from the excavations are of probable local origin. Most of the andesites and all the miscellaneous materials are found locally, and probably came from the beach fronting the site. The phyllites and siliceous phyllites are also local. Large outcrops of these materials are found in cliffs along the south side of the island.

Of the 16 types of lithic material identified, only three, argillized andesite (10 flakes), propylitized andesite (11 flakes), and aphanitic andesite (11 flakes), have no obvious local source. The nearest potential sources for these exotic materials are in the Rat Islands or the Near Islands. Material analysis suggests at least a small percentage of the materials on Buldir were imported. Propylitized andesite is the most common tool material in the Shemya Island assemblages, indicating that the Near Islands are a likely source for this material.

**Table 2.** Flake analysis, andesite and basalt.

Material Type	Name	Pit 1	Pit 2	Total
A	porphyritic andesite	93	17	110
B	porphyritic andesite	3	20	23
C	hornblende andesite	3	0	3
D	andesitic basalt	35	27	62
E	andesitic basalt	13	3	16
G	andesitic basalt	0	11	11
L	argillized andesite	0	10	10
P	propylitized andesite	11	0	11

**Table 3.** Flake analysis, phyllites.

Material Type	Name	Pit 1	Pit 2	Total
H	gray phyllite	316	300	616
J	green phyllite	77	230	307
I	gray siliceous phyllite	135	128	263
K	green siliceous phyllite	147	229	376

**Table 4.** Flake analysis, miscellaneous classes.

Material Type	Name	Pit 1	Pit 2	Total
G	basaltic ash	0	2	2
Q	gabbro	6	0	6
O	white quartz	7	0	7
R	jasper	1	0	1

## Chipped Stone Tools

Aleut stone-working technology is characterized by irregular cores and a bifacial flaking technique. A wide variety of points, tanged and untanged knives, scrapers, and drills are common. For the western islands, the most relevant sources on lithic tools are McCartney (1971, 1977), Spaulding (1962), Hurt (1950), and Desautels et al. (1971). Although some artifacts are finely made, the overall quality of raw materials may have limited craftsmanship. Hrdlička (1945), Spaulding (1962), and McCartney (1971) have discussed the unique chipping styles and tool forms of the Near Island Aleuts.

The lithic industry of Buldir is unique due to the use of phyllites. Phyllite was abundant in thin slabs and required only minimal shaping and marginal sharpening to be functional. Cutting and scraping tools were formed on conveniently sized and shaped flakes with minimal modification. Except for some items made on siliceous phyllites, most tools were clearly expedient—crude, easily dulled, and readily replaced. Formal shapes are

distinguishable in tools on better quality material, and can be compared to artifacts from the Rat and Near Islands.

A total of 59 flaked and ground stone tools were collected. Flaked and ground tools were divided into three functional categories. Except for projectile points, where symmetry has some bearing on function, most chipped stone tools vary widely in shape. All recognizable tools are composed of phyllite or siliceous phyllite.

## Projectile Points

Nine points and point fragments were found (Fig. 8). This is the most distinctive class of stone artifacts since they are all made with finer materials and exhibit better workmanship than most tool classes. All are presumed to have been tips on projectiles used for hunting. Some or all may also have been used as cutting tools.

Two points have symmetrical, triangular blades with eared shoulders and contracting stems with a straight base (Fig. 8a). They are similar to the flat-based, stemmed points, type D5, from the middle levels of site Rat 36 on Amchitka Island (Desautels et al. 1971:114, plate 58).

Two points have ovate blades and straight bases, with rounded junctures between the blade and stem (Fig. 8b). Desautels et al. (1971:114, plate 58) illustrate a similar flat-based, stemmed, type D12 point from the lower levels of Rat 31.

A finely made leaf-shaped point on a slightly curved flake of light green chert is identical to an unstemmed type B5 point (Desautels et al., 1971: 112, plate 56).

Three fragments are from long slender points (Fig. 8c). One is a tip section, one a thick, clumsy midsection, the third has a round base. None of these fragments shows the regular serrations or incisions diagnostic of the Near Islands. However, the emphasis on linear points is itself characteristic of Near Island assemblages (McCartney 1971). Contracting stemmed points are represented by a single midsection (Fig. 8d).

## Scrapers or Adzes

Many of the scrapers and/or adzes may be wood-working tools. Most were found in Pit 1, together with abundant wood fragments and chips. All but one of the ten scrapers described are end scrapers.

Seven belong to a single type with two variants (Fig. 9e). They have flat ventral surfaces and flat to irregular dorsal surfaces. Bodies are rectangular or oval with parallel sides. Butt ends are roughly worked, and all but one are straight. In four of the examples the bit is flat; in the other three, the bit is angled. An additional specimen is similar except that the butt end is pointed. The last end scraper is on a triangular flake.

The only side scraper is a long ovoid biface with working edges on both sides. The ventral face is flat and the dorsal is domed. The ends slope to thin, chisel-like edges.

### Knives

Knives comprise the most problematic artifact category. Most specimens have irregular shapes and were made on conveniently sized or shaped flakes or slabs. Some may have served as projectile points and/or scrapers. Fifteen pieces are described.

Two ground stone ulu blades of phyllite, one complete, one broken, were recovered. The complete specimen is a rectangular slab shaped by chipping on two edges and by sawing and then snapping on the third (Fig. 9a). The cutting edges of both ulus are ground.

Three knives are backed and posteriorly stemmed, resembling types B14 or 18 illustrated by Desautels et al. (1971:92, plate 48). On two, the chipped backs appear to have been used for scraping (Fig. 9b).

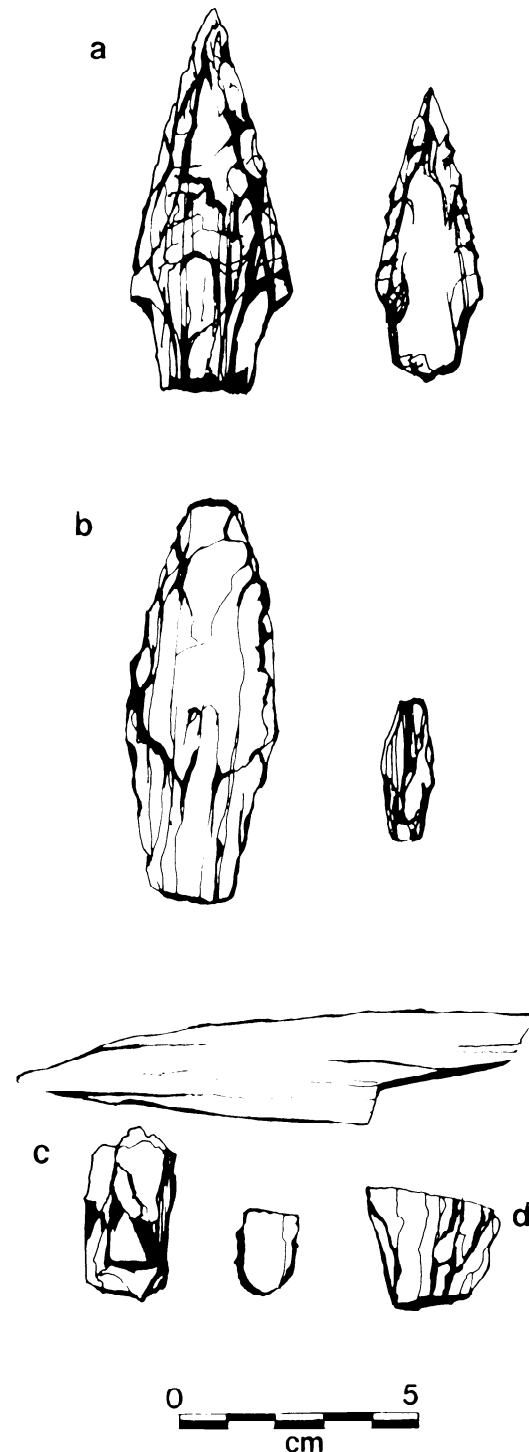
Two knives have symmetrical, triangular blades with off-center, asymmetrical, and straight-based stems (Fig. 9c). Two other fragments are stemmed with oval blades (Fig. 9d).

Six other knives are unique, mainly expedient tools. Four are made on conveniently shaped slabs of phyllite: (1) a narrow, crescent shaped flake (Fig. 10a); (2) a roughly rectangular, very thin slab of phyllite (Fig. 10b); (3) a thin slab with a convex cutting edge, flat stem and back, tapered to a point; and (4) a long, narrow blade with a straight base, one blunt edge, and a sharp point. The presumed cutting edge is jaggedly broken along the length of the piece. A fifth piece is a carefully worked biface with a lenticular cross section (Fig. 10c). The last is an unmodified boulder spall with use wear along one sharp edge (Fig. 10d).

### Cultural Affiliations of the Stone Tools

Because the 1991 sample is so small, preliminary analysis of stone tools from 1993 excavations on Buldir will be included to examine possible cultural affiliations of the Buldir Islanders (Wilmerding 1994). The stratigraphic context and age of the 1993 tools match those of Pit 1 from which most of the 1991 artifacts were recovered. The collections are, therefore, directly comparable.

A total of 315 stone artifacts were recovered in 1993. Of these, 121 were unidentifiable as to form or function, leaving 194 for comparison. Wilmerding (1994) followed McCartney (1971) in her attempt to determine cultural affiliations for the Buldir materials. Two Near Island artifact types, shouldered projectile points and linear projectile points, make up 14% and 21% of the Buldir assemblage. Concavo-convex blade shapes and



**Figure 8.** Stone projectile points: (a) triangular blades; (b) ovate blades; (c) parallel-sided point fragments; (d) contracting-stemmed point fragment.

contracting stem knives are also reported from the Buldir assemblage but no numbers are presented. An additional four Near Island traits (parallel flaking, decorative incising, spall knives, and ground scrapers) are missing from Buldir, but the local materials do not lend themselves to these techniques.

In comparing Buldir materials to Amchitka collections (Desautels et al. 1971), Wilmerding (1994) notes that broad, triangular-bladed points are much more common than parallel-sided points (30 versus 11 categories). The 27 triangular-bladed points on Buldir make up 14% of the artifact inventory. Wilmerding also notes a large group of objects that appear to be unique to Buldir, including disk-like pieces, parallel-sided chipped ulus, split cobbles, delicate willow leaf points, and types of gravers and drills. Much of this uniqueness may be due to the raw materials available for tools on Buldir.

Wilmerding's analysis of 1993 materials supports tentative conclusions reached in 1991. The atypical lithic materials hamper a definitive statement on the affiliations of the Buldir Islanders. Artifacts and exotic materials suggest that Buldir was used by people from both the Rat and Near Islands in the late prehistoric period (240 to 530 BP, uncorrected).

### Cobble Tools

In addition to the chipped and ground stone pieces a small number of cobble tools were collected. These include two net sinkers, four griddle stones, and nine hammer/chopper tools.

Two notched stone net or line sinkers comprised the only fishing gear recovered. Both sinkers are rounded cobbles of andesite (types A and B) with pecked notches on the ends. Both the lack of fishing equipment and small quantities of fish bone (see Lefèvre et al. 1997) in the midden suggest fish were not an important resource on Buldir.

Four artifacts identified as griddle stones were collected. Five additional specimens were measured in the field and left behind. They are triangular or rectangular flat slabs about 20–30 cm on a side and 3–6 cm thick. All of the fragments are of type A or B andesite. One or both faces of all specimens are caked with a black encrustation.

Few cobbles were identified as cores, with a primary purpose of providing flakes for tools. Most cobbles with flake scars have flattened, heavily battered ends with poorly defined flake scars and were probably used as hammers. Seven, all of type A andesite, were collected.

One cobble of andesite B may have originally been a sinker. Both ends were battered, leaving long shallow flake scars down all sides. The battered ends form pointed edges that may have been

used for chopping. A final cobble is burned on one end and side; the opposite end is battered. The flat faces of the stone bear signs of having been used as anvils.

### Bone Artifacts

Aleuts perfected an elaborate bone industry which included intricate harpoon and spear points as well as fishhooks, needles, awls, and other utilitarian objects. A variety of decorated articles are also known. Bone technology is most thoroughly described for Amaknak Island (McCartney 1967) and Amchitka Island (Desautels et al. 1971). Spaulding (1962) remarked on the low percentage of bone tools found in his excavations on Agattu Island in the Near Islands. He saw this as a reflection of an impoverished material culture due to the isolation of that island group. McCartney (1971) suggested, instead, that the Near Islanders developed a unique bone industry.

Although bone preservation on Buldir was excellent, and large quantities of faunal materials were collected, the site was not rich in bone artifacts. Only 19 tools were recovered: ten of mammal bone, seven of bird bone, and two of ivory. A fragment of worked sperm whale tooth was also recovered. Most miscellaneous, worked bone fragments were of whale bone. Nine pieces were found in Pit 1 and 15 came from Pit 2.

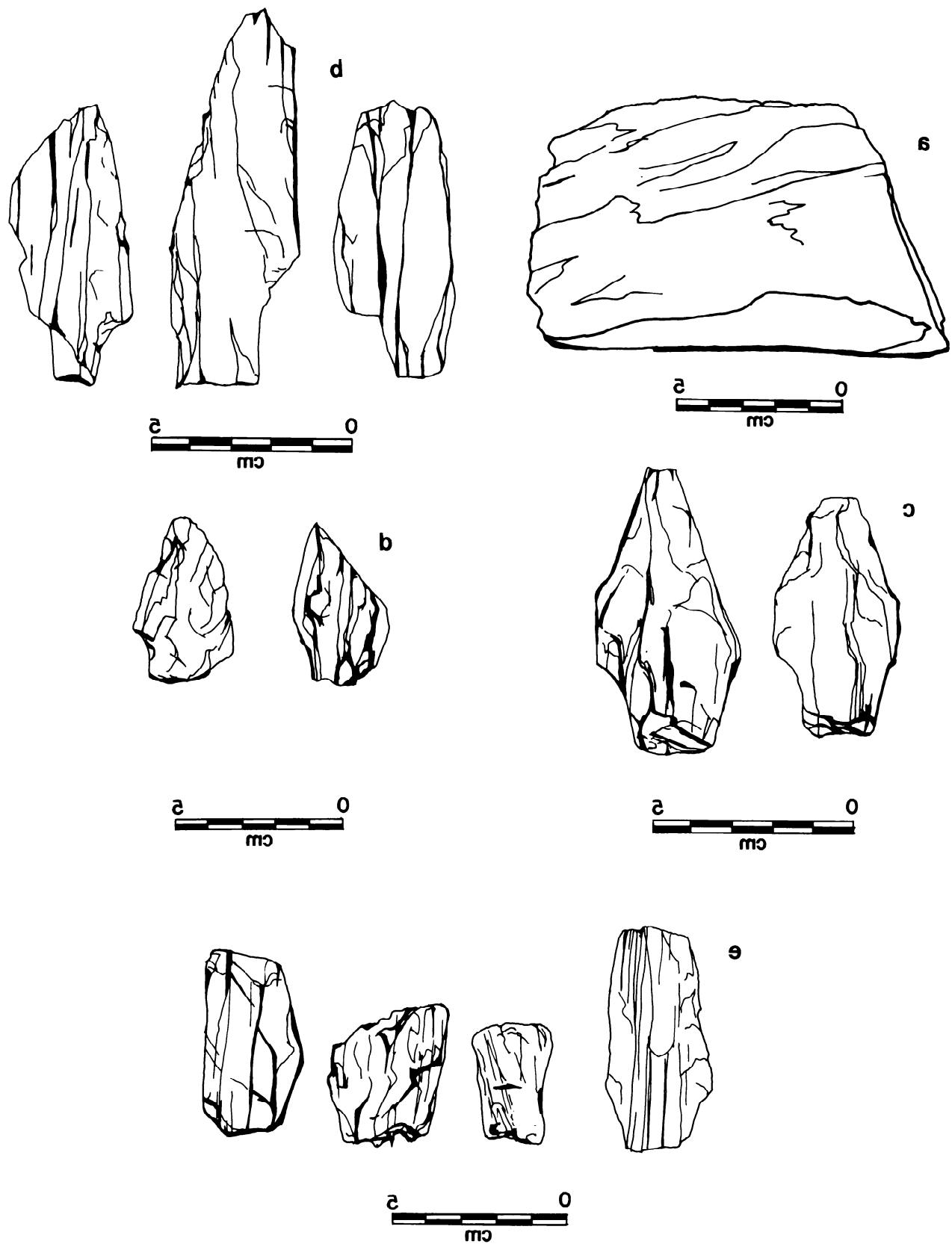
### Mammal Bone Artifacts

Most mammal bone artifacts were manufactured from large pieces of bone, probably from whales. For the most part, they are crudely made and show signs of working, rather than being smoothly finished. Artifacts include two foreshafts, a blunt, a slab, a paddle, a button, and wedges.

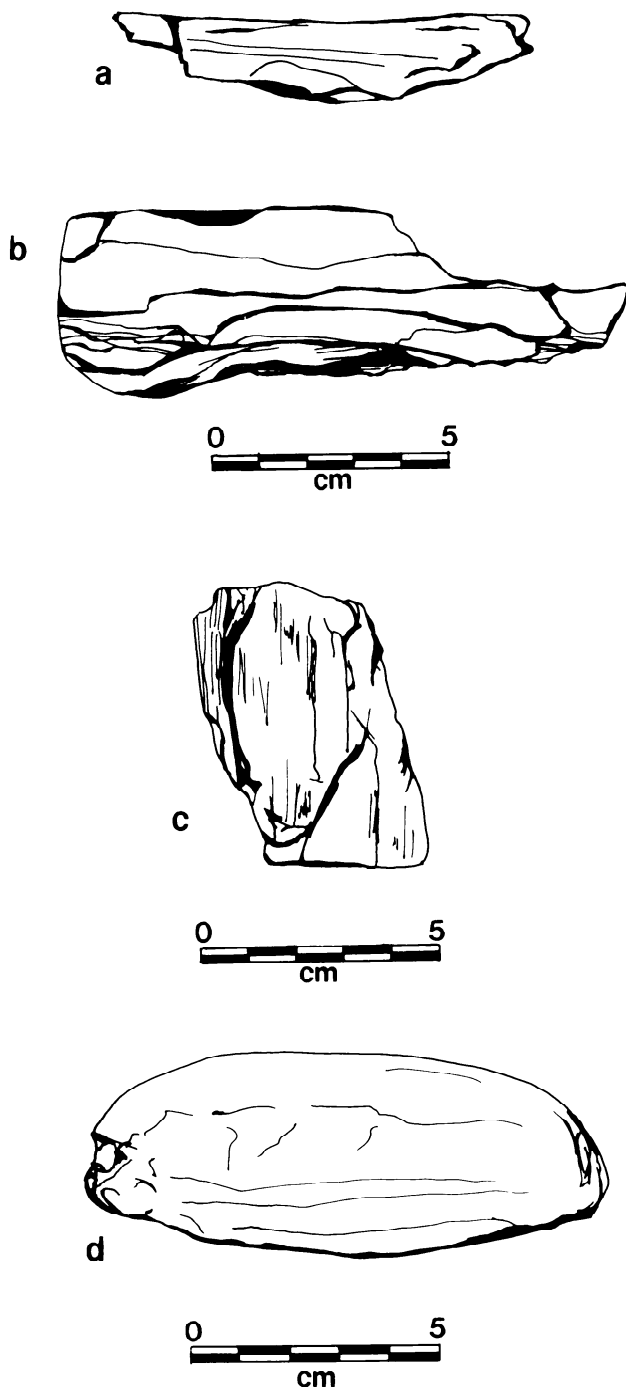
One foreshaft has a flattened oval cross section and a slight taper from base to tip. The base is flat, and notches mark both edges, about 1 cm up the shaft. The tip is slightly rounded and blunt (Fig. 11a). The second foreshaft is a slender rod with a step bevel at one end (Fig. 11b). The blunt is a cone of dense bone (Fig. 11c).

Two bone artifacts are unusual. One is a bone paddle blade (Fig. 11d). The blade tapers from a width of 5.4 cm to 1.5 cm at the rounded tip. The handle is broken off just below the widest portion of the blade. It is well shaped and carefully finished. The second piece is a small, mushroom-shaped button (Fig. 11e). The crown is a smooth dome and the stem is well rounded. At the base, a groove encircles the stem. This may be a button fastener for a basket or other small container.

Four wedges were recovered. Three can be comfortably held in the hand but are not symmetrical or well formed (Fig. 12a). The bodies show



**Figure 9.** Stone knives and scrapers: (a) ground stone ulu; (b) backed knives; (c) asymmetrically stemmed knives; (d) oval-bladed knives; (e) end scrapers.



**Figure 10.** Stone knives: (a) crescent flake knife; (b) rectangular slab knife; (c) biface fragment; (d) boulder spall.

deep, wide chopping marks used to roughly shape the wedges. The heads are battered. A fourth wedge is small and well shaped, although one side and face have chop marks. The rough face is further marked by a shallow, smooth-floored depression, and may have been used as a drill base.

### Bird Bone Artifacts

Six bird bone awls were recovered (Fig. 12b). These were made from four murre humeri and the radii of an albatross and cormorant. The seventh bird bone artifact is a decorated albatross humerus (Fig. 11g). The humerus is unique. Except for the incised decorations, the bone is unmodified. There are two types of incisions. The first is a row of 13 deep chevrons beginning near the distal end of the bone and extending about two-thirds of the length of the shaft. Three shallower, straight lines cap the chevron row. Two fainter chevrons on the opposite side of the bone complete the series. At the distal end of the humerus, opposite the chevrons, two stick figures are sketched. The smaller is a triangle with the apex away from the end of the bone. The base is not closed and two sets of two lines radiate out of the center. The larger figure consists of two triangles, the smaller resting on the larger. Both point toward the end of the bone. The base of the larger triangle tapers slightly to an unfinished point, with lines radiating from the center. The smaller triangle has three to four lines radiating out both sides. This figure is reminiscent of a parka-clad human wearing a conical hunting hat.

This piece has no exact analogue in published descriptions of Aleut bone work. McCartney (1967:443–445) described bone tubes with lines incised at regular intervals which he thought might be gauges. This piece is qualitatively different from those illustrated by McCartney, although the decorative technique is the same. Interestingly, all but one of McCartney's ten examples were from the Near Islands, suggesting this style is a geographic marker for the western Aleutians.

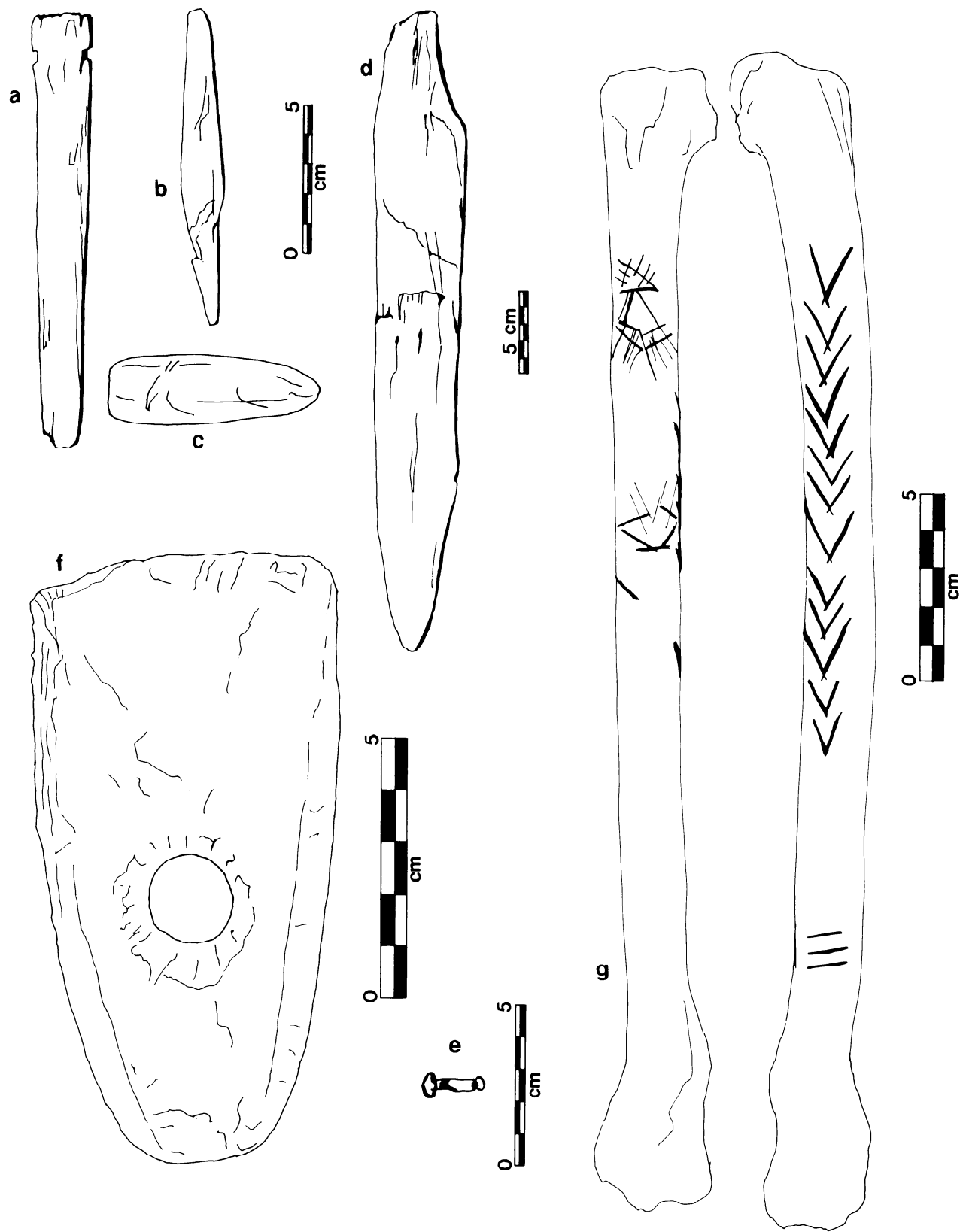
### Ivory Artifacts

Two items of ivory, a scraper and an adze haft, probably made of sperm whale teeth, were recovered. The scraper is a thin, rounded rectangular slab with numerous fine grooves on both faces. The adze haft is grooved at the lingual end to support the stone blade. An aperture in the center of the piece held the handle (Fig. 11f).

### Cultural Affiliations Revealed by Bone Artifacts

The bone blunt matches McCartney's (1971) description of a distinctive Near Island type. The decorated albatross humerus also suggests a Near





**Figure 11.** Bone artifacts: (a) notched base foreshaft; (b) step-bevelled foreshaft; (c) bone blunt; (d) bone paddle; (e) button; (f) adze haft; (g) decorated albatross bone.

Island association, but does not precisely match the known examples. These few clues strengthen the impression that Buldir was used in the late prehistoric period by people from the Near Islands. This evidence is far from conclusive, as most of the bone artifacts are generic Aleutian types, common all along the chain.

## Conclusions

One of the primary goals of the 1991 excavations was to evaluate the potential of the site on Buldir to address paleobiological research questions. In addition we sought to clarify the rate of expansion of Aleut colonists to the western islands, and to study intergroup contacts between Rat and Near Islanders to understand the effects of isolation on the flow of cultural traits into the extreme western end of the island chain.

The two test pits on Buldir exceeded our expectations for research of the island's environmental history. Several unique circumstances greatly increased the research value of the site. Unlike most Aleutian sites, individual cultural levels are separated by sterile sand, giving us an opportunity to study discrete occupations over roughly 1100 years. Furthermore, the saturated clay soils of the cultural layers preserved a wide range of fragile, organic materials rarely found in middens. Biological and zooarchaeological analyses of the well-preserved organic remains have yielded information on the past environment as well as the human use of the island's resources (see Lefèvre et al. 1997).

One unexpected bonus of preservation was the opportunity to recover and study well-preserved wooden objects. Only one other wet site in the Aleutians, the lower levels of Saa (Akun Island), has been reported (Holland 1992). While the range of artifacts recovered from Buldir is limited,

the site is an invaluable source of information on Aleut woodworking technology, which upon first analysis is very similar to the boneworking technology.

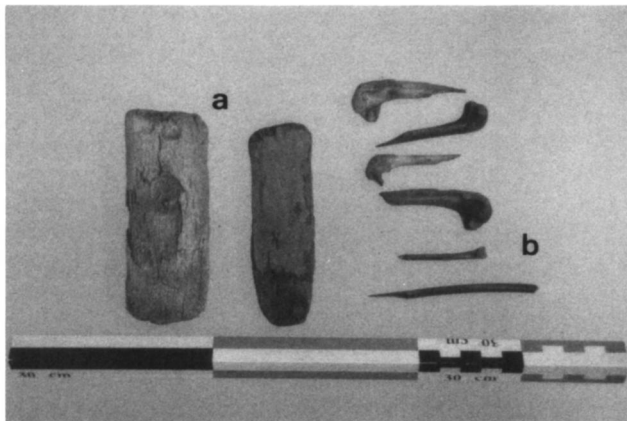
The first season of work gave us a broad outline of site chronology, while work in 1993 expanded on the latest period of occupation at the island. Additional work is needed to clarify the relationships among the older levels. We expected the earliest use of Buldir to mirror the oldest known occupation of the Near Islands, about 3000 BP. Our oldest date, 1160±50, falls far short of those regional dates. An older occupation may have been lost to erosion, or may be located elsewhere in the site, for it is difficult to imagine that Buldir would not have been used by the earliest people moving between the Rat and Near Islands.

Why Aleuts used Buldir is not at all clear. The site does not appear to have been a seasonal hunting camp in an annual subsistence cycle, and the resources available were not unusually rich to attract human attention. Occupation was intermittent, with long breaks, although in the late prehistoric period there was a longer period of use. Remains indicate the occupation was at times intensive. When people were on Buldir they built substantial houses and engaged in extensive wood and stone tool manufacture; however, the resource base was not sufficient to allow permanent occupation of the island. The island may have simply been a sporadically used hunting ground (Black 1984), or it may have been a refuge or frontier zone where people facing resource or social pressures in their home islands could retreat until conditions improved.

Available artifactual evidence, and the island's location, suggest both Rat and Near Islanders used Buldir, perhaps concurrently. The Near Islands were in many ways culturally unique, and lacked many traits considered distinctly Aleut. Additional research should allow us to examine the cultural exchange between politically independent and sometimes hostile groups of Aleuts. Buldir is uniquely positioned for study of geographic and social barriers to exchange and culture change.

The limited test excavations do not allow more definitive answers to other research questions. In summary, the limited tests completed in 1991 confirm the great potential of the site on Buldir for productive research on the paleobiology and human prehistory of the western Aleutian Islands.

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**Figure 12.** Bone artifacts: (a) wedges; (b) bird bone awls.

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## References

- BIA ANCSA  
1992 Rat Islands Overview, BLM AA-11927, compiled by Fred Clark. Report on file, BIA ANCSA office, Anchorage.
- n.d. Radiocarbon dates for sites AA-11960, 11967, 12011, 12013. On file, BIA ANCSA office, Anchorage.
- Black, Lydia  
1984 *Atka: An Ethnohistory of the Western Aleutians*. Limestone Press, Kingston, Ontario.
- Byrd, Vernon, and Robert H. Day  
1986 The Avifauna of Buldir Island, Aleutian Islands, Alaska. *Arctic* 39(2):109–118.
- Coats, Robert R.  
1953 *Geology of Buldir Island*. U.S. Geological Survey Bulletin 989-A.  
1956 *Reconnaissance Geology of Some Western Aleutian Islands, Alaska*. Investigations of Alaskan Volcanoes, U.S. Geological Survey Bulletin 1028-E.
- Cook, John P., E. James Dixon, and Charles E. Holmes  
1972 *Archaeological Report Site 49 Rat 32 Amchitka Island, Alaska*. University of Alaska. Holmes and Narver contract AT(29–2)–20.
- Corbett, Debra  
1990 Archaeological Survey and Testing on Shemya Island, Western Aleutians, Alaska in June 1990. Final Report to the Geist Fund. University of Alaska Museum, Fairbanks.
- Dall, William H.  
1877 On Succession in the Shell Heaps in the Aleutian Islands. In: *Tribes of the Extreme Northwest*, edited by J.W. Powell, pp. 41–91. Contributions to North American Ethnology 1. U.S. Government Printing Office, Washington, D.C.
- Desautels, Roger J., Albert J. McCurdy, James D. Flynn, and Robert R. Ellis  
1971 *Archaeological Report, Amchitka Island, 1969–1970*. USAEC Report TID-25481, Archaeological Research Inc., Los Angeles.
- Frohlich, Bruno, and David Kopjansky  
1975 Aleutian Site Surveys 1975. Preliminary Report to the Aleut Corporation, Anchorage.
- Holland, Katherine  
1992 *Rethinking Aleutian Prehistory as Viewed from a Lithic Database*. Ph.D. dissertation, Department of Anthropology, Arizona State University, Tempe.
- Hrdlička, Aleš  
1945 *The Aleutian and Commander Islands and their Inhabitants*. Wistar Institute of Anatomy and Biology, Philadelphia.
- Hurt, Wesley R.  
1950 Artifacts from Shemya, Aleutian Islands. *American Antiquity* 16(1):68–69.
- Jochelson, Waldemar  
1925 *Archaeological Investigations in the Aleutian Islands*. Carnegie Institution of Washington, Washington, D.C.
- Jones, Robert  
1962 Refuge Annual Report, Aleutian Islands National Wildlife Refuge. Report on file, U.S. Fish and Wildlife Service library, Anchorage.
- Laughlin, William S., and Jean S. Aigner  
1975 Aleut Adaptation and Evolution. In: *Prehistoric Maritime Adaptations of the Circumpolar Zone*, edited by W. Fitzhugh, pp. 181–210. Mouton, The Hague.
- Lefèvre, Christine, Debra G. Corbett, Dixie West, and Douglas Siegel-Causey  
1997 A Zooarchaeological Study at Buldir Island, Western Aleutians, Alaska. *Arctic Anthropology* 34(2):118–131.
- McCartney, Allen P.  
1967 *An Analysis of the Bone Industry from Amaknak Island, Alaska*. M.A. thesis, Department of Anthropology, University of Wisconsin, Madison.  
1971 A Proposed Western Aleutian Phase in the Near Islands, Alaska. *Arctic Anthropology* 8(2):92–142.  
1972 Archaeological Site Surveys and Inventory for the Aleutian Islands National Wildlife Refuge, Alaska. File Report 1-1-72, on file, U.S. Fish and Wildlife Service library, Anchorage.  
1975 Maritime Adaptations in Cold Archipelagos: An Analysis of Environment on the Aleutian and Other Island Chains. In: *Prehistoric Maritime Adaptations of the Circumpolar Zone*, edited by W. Fitzhugh, pp. 181–210. Mouton, The Hague.
- 1977 Prehistoric Human Occupation of the Rat Islands. In: *The Environment of Amchitka Island, Alaska*, edited by M.L. Merritt and R.G. Fuller. Energy Research and Development Administration, Technical Information Center, TID-26712.

- Nelson, Edward W.  
1899 *The Eskimo About Bering Strait*. 18th Annual Report of the Bureau of American Ethnology for 1896–1897. Reprinted in 1984 by the Smithsonian Institution Press.
- Siegel-Causey, Douglas, Debra Corbett, Christine Lefèvre, and Stephen Loring  
1995 Report of the Western Aleutian Archaeological Project, Shemya Island, August 1994. Report to the National Geographic Society.
- Siegel-Causey, Douglas, Christine Lefèvre, and Debra Corbett  
1991 Report of the Buldir Island Expedition: Preliminary Excavation of the Aleut Midden Site, July–August 1991. Report on file, U.S. Fish and Wildlife Service, Anchorage.
- 1993 Report on the Buldir Island Expedition: Second Season in the Aleut Midden Site. Preliminary Report to the National Geographic Society.
- Sowls, Arthur L., Scott A. Hatch, and Calvin J. Lensink  
1978 Catalog of Alaskan Seabird Colonies. U.S. Fish and Wildlife Service, WB/OBS-78/78, Anchorage.
- Spaulding, Albert  
1962 *Archaeological Investigations on Agattu, Aleutian Islands*. University of Michigan, Museum of Anthropology, Anthropological Papers 18. Ann Arbor.
- Weyer, Edward M.  
1929 An Aleut Burial. *Anthropological Papers of the American Museum of Natural History* 31(3):225–238.
- Wilmerding, Elizabeth G.  
1994 A Brief Description of Buldir Island Lithic and Bone Tools and a Comparison with Material from the Rat and Near Islands. Paper presented at the Annual Meeting of the Alaska Anthropological Association, Juneau.
- Yesner, David  
1980 Maritime Hunter-Gatherers: Ecology and Prehistory. *Current Anthropology* 21(6):727–735.
- Yesner, David, and Jean S. Aigner  
1976 Comparative Biomass Estimates and Prehistoric Cultural Ecology of the Southwest Umnak Region, Aleutian Islands. *Arctic Anthropology* 13(2):91–112.